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FIG. 1. TYPICAL LONGLEAF PINE FOREST OF THE WESTERN LOUISIANA-TEXAS AREA. NOT INFREQUENTLY PATCHES OCCUR THAT WILL CUT 20,000 TO 25,000 FEET OF TIMBER, BOARD MEASURE, TO THE ACRE.

THE FORESTER.

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TEXAS FORESTS AND THE PROBLEM OF FOREST MANAGEMENT FOR THE LONGLEAF PINE LANDS.

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THE peculiar relation of the Texas region to the distribution of rainfall and humidity gives special significance to the question of forest resources. Texas lies across the zone of transition from the Gulf type of rainfall (exceeding 40 inches annually) to the Great Plains type (under 20 inches annually), the Mexican type (of low annual precipitation with maximum in September) and even extends so far west as to bring the western boundary within the Pacific zone of climatic influence with a meagre rainfall of less than 10 inches, and a relative humidity represented by an evaporation capacity of 80 inches annually.

These extremes of moisture conditions, together with geological structure and physiography, determine in general the presence or absence of forested areas, and in particular the type of forest prevailing upon a given timbered area. Of course, a great portion of the State's area is treeless, and even a larger portion possesses a dwarf woody vegetation—for example, the Rio Grande Chaparral—of more than doubtful value, or a sparse and insufficient tree growth—the Mesquite prairies. It is estimated, however, that about 24 per cent. of the State is timber land. This includes several prominent forest types of varying degrees of value commercially or in a protective way. The timber areas are as follows (Fig. 2): (1) The East Texas region, known as the Lignitic belt; (2) The eroded Cretaceous area—the Edwards Plateau—of central Texas; (3) The highest mountain summits and mountain cañons in Trans-Pecos Texas, and (4) The river bottom timber in the prairie and plains areas of central and western Texas.

By far the most important of these areas is that of the East Texas Lignitic Belt, and here lies at present the more urgent need of conservative forestry. In dismissing the remaining areas from the present discussion, it should be stated that while none are of commercial significance more than locally, the timber of the erosion or hill country of the Edwards Plateau is of great value in a protective way; namely, in its relation to water supply and to preventing soil erosion and destructive floods to which the region is subject.

This will give rise to one of the chief forest problems of the future. The East Texas forests are a part of the great forest area of the Atlantic Coast Plain, which, entering the East Texas region in typical luxuriance, comes presently into a region of reduced rainfall and unfavorable (for forests) geological structure and so terminates, except for the outlying Cross Timbers and an area which extends towards the Rio Grande beyond the Colorado River (Fig. 2).

The entire western margin and the outlying areas just mentioned, are occupied by the so-called post oak (*Quercus minor*) timber and commercially are of no general value. The areas, however, give rise to another problem for future forest administration; namely of replacing the oak timber by certain pines or other valuable species—a thing which, apparently, would be possible to a valuable degree. This constitutes the most valuable element in each case. The first is the Shortleaf Pine (*Pinus echinata*), which occupies an area of over 25,000 square miles, forested with a mixed growth of pine and hardwoods, lying in the northeast corner of the State and southward along the east side as far as Angelina County. The second is the Loblolly Pine (*Pinus Tæda*), which occurs with lowland and swamp hard-

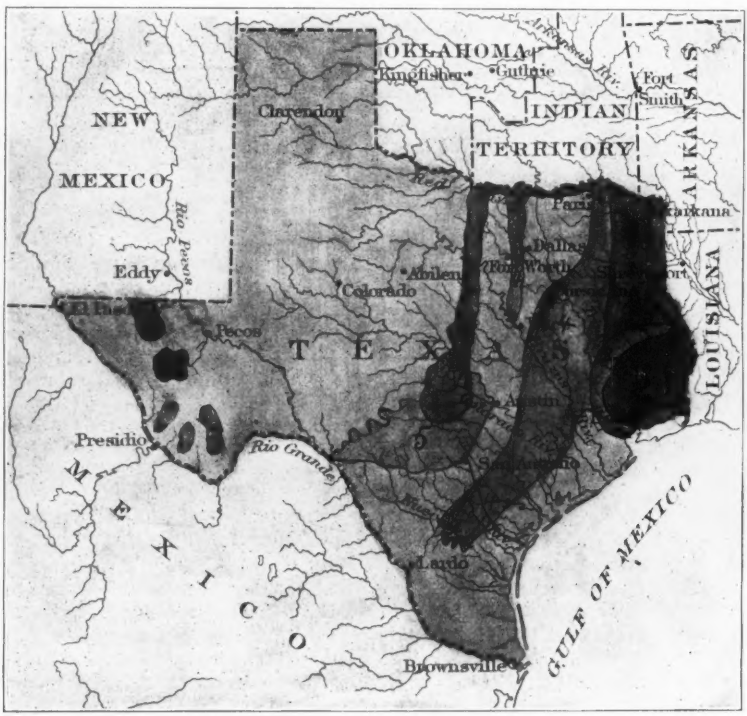

FIG. 2. FOREST TYPES IN THE TEXAS REGION: 1. SHORTLEAF PINE AND HARDWOODS; 2. LOBLOLLY PINE AND SWAMP HARDWOODS; 3. LONGLEAF PINE; 4. POST OAK TIMBER; 5. TIMBER OF THE CRETACEOUS HILL COUNTRY—MIXED CEDAR, OAK AND OTHER SPECIES; 6. ROCKY MOUNTAIN FOREST TYPE.

leaves the East Texas forests proper which in turn present three forest types, each offering its peculiar problems of forest management. Each of these types is characterized by a species of pine which woods over an area of some 6,000 square miles bordering the coast prairie as far west as Houston and thence northward to the Shortleaf belt, but interrupted by the third type, the Longleaf Pine (*Pinus pal-*

ustris), which occurs typically in pure forests over an area probably not exceeding 5,000 square miles. This body of Longleaf Pine is the westward continuation of the large Longleaf Pine area of

FIG. 3. LONGLEAF PINE LAND AFTER LOGGING OPERATIONS, SHOWING WASTE AND DEBRIS, AND AMOUNT AND CONDITION OF TIMBER REMAINING UNCUT. JASPER CO., TEXAS.

Western Louisiana and is thrust in between the shortleaf and loblolly areas. In the longleaf area also, the bayous and streamways are accompanied by the loblolly and swamp hardwoods.

Lumbering operations, directed chiefly to marketing more than locally the pine timber have been carried on in all these forests for more than forty years, but the lumber business in Texas and Western Louisiana has only within the past ten years assumed dimensions at all comparable to those of the recognized lumbering states. In 1880 the total cut in Texas forests was estimated at 328,000,000 of feet. In 1900 it reached the high mark of one billion feet. By far the greater part of the cut of the past few years has been taken from the longleaf forest, and since this is the most valuable forest area while at the same time the smallest, it presents the most urgent as well as the most critical problem for forest management. Confining attention, therefore, to the Longleaf Pine forest we may inquire into the condition of affairs more minutely. (Fig. 1.)

In the first place, it is (aside from its inherently greater value as timber land) a more critical and difficult question than either that of the shortleaf or the loblolly forests just because the Longleaf Pine occurs in pure forest formation; for while in the former cases a forest stand of some kind is left on the ground, in the latter case a tract of forest may be of such uniformly large sized trees that logging operations leave almost nothing upon the ground. From the forester's point of view, of course, such a cut as that would never be neces-

sary, but from the lumberman's point of view it is to be made when in his judgment that method will yield him the greatest profit. Until within a comparatively few years, it did not pay to cut clean, so that lands logged over ten to twenty-five years ago have a good deal of timber on them. But with recent advances in price and methods of utilizing young timber, many lumbermen find it most profitable to cut clean, thus leaving the ground practically bare as it begins its new era.

would not have been cut ten years ago now finds a ready market, so that the result of logging is to leave at best only a thin stand of small or diseased timber. The actual conditions are worse than this, however, because the ground is strewn with great quantities of waste logs and tops in which successive fires find ready fuel and so, burning periodically, prevent any seedlings from developing. Meanwhile the grasses come in in greater abundance and add material for the flames (Fig. 3).

FIG. 4. YOUNG LONGLEAF ("ORCHARD") PINE ON LAND LOGGED-OVER TWENTY-FIVE YEARS AGO. SHOWS SMALL PINES ON MARGIN OF AREA EXPOSED TO PERIODIC FIRES. TO THE RIGHT ARE GOOD TREES WHICH WERE LEFT AFTER FIRST LOGGING, NOW READY FOR THE MILL.

This longleaf area is the center of a tremendously active lumber business. The market demand is strong, the prices good and there is really very little to interrupt active operations from the year's beginning to its close. Under these circumstances, the forest capital is being whittled down at a rapid rate. As already stated, a great deal of young or imperfect timber that

The waste of material as a result of logging operations is a deplorable thing, and to none more than the lumbermen themselves. There are instances in which waste logs would appear to aggregate nearly one-half of the total cut. This means, of course, much diseased and imperfect timber. Still, such material would be too gladly seized upon and will be when

the supply becomes slim and prices still much higher. Further, in the actual logging operations there is a kind of waste which it seems might be avoided. This is the destruction of saplings and poles by the felling and removing of the large trees. Sometimes in actual numbers the trees so destroyed outnumber two or three times those actually cut for the mill. These matters, of course, have their bearing upon the question of forest renewal.

Looking over the field now at the end of a quarter century of active lumbering, one finds:

1. That still a vast deal of mature pine —no one knows approximately how much —is waiting to be harvested.

2. That many thousands of acres of logged-over land are an unproductive wilderness of tall grasses, widely scattered saplings and blackened trunks; for example, for the first ten miles east of Moscow in Polk County.

3. That even more thousands of acres are covered with an open stand of perfect young pine which is rapidly growing into mill timber; for example, between Beaumont and Olive, and Beaumont and Silsbee. (Fig. 5.)

FIG. 5. FIELD OF LONGLEAF PINE IN HARDIN CO., TEXAS LOGGED-OVER MORE THAN FIFTEEN YEARS AGO. TYPICAL OF MANY TRACTS LOGGED-OVER IN EARLIER DAYS OF LUMBERING. COMPARE FIG. 6.

4. That on large tracts logged over twenty and twenty-five years ago, trees that were then too young to find a market have since matured and constitute some very valuable forest land,—recent cuts upon such tracts having yielded as high as 5,000 feet of timber to the acre. (Figs. 4, 5.)

5. That present markets, methods of preserving sap timber, and regard for the economy of tram building, lead to a much closer cut than formerly and consequently leave less young or imperfect timber to begin forest renewal upon.

6. That the amount of reforestation by seedlings has been so inconsiderable as to constitute no important factor in estimating future timber supply.

7. That in connection with 6 and probably the cause of condition therein described, the logged-over lands, in common with virgin forests, have been swept by fires annually or at such frequent periods as to destroy practically all seedlings. (Fig. 6.)

8. That while some thousands of acres of logged-over lands have been cleared up for farming, many thousands of acres of unimproved lands are offered for sale at a low figure, including state lands formerly leased for the timber on them.

These conditions furnish part of the facts upon which to estimate the possibilities of natural reforestation upon such lands and the practicableness of adopting a conservative forest policy for lands still uncut.

The very practical question now arises as to whether, if given an opportunity, this Longleaf Pine land will reforest itself. The fact previously pointed out that after twenty-five years of lumbering the amount of growth being added from seedlings is inconsiderable, would seem to suggest a negative answer. This coincides with the view commonly held by lumbermen. But my observations upon this point suggest a different conclusion. The seeds of Longleaf Pine are ordinarily produced in great abundance and become well scattered. They germinate readily; thrusting forth the radicle even before they leave the burr. In the fall, thousands of seeds are found far enough along in germination to have secured their attachment to the soil. On places where the annual burning off of

FIG. 6. PINE LAND ADJACENT TO THAT SHOWN IN FIG. 5. SHOWS THE PATH OF A DESTRUCTIVE FIRE WHICH FOLLOWED LOGGING AND RUINED PROSPECTS FOR SECOND CUTTING.

grass has been missed, one finds many seedlings of a year's growth. Furthermore, where there is a spot which, for some reason, has escaped fire during a series of years, one finds a close stand and most beautiful growth of young Longleaf or "Orchard Pine" as it is called (Fig. 4). Even these young patches have a constant struggle with fire on their borders. I recently saw one where the fire had invaded the outer ranks and singed all the leaves except the terminal tuft. Thanks to the resistant qualities of this species when young, this fiery treatment had not killed them. The periodic recurrence of this burning off of grass and débris on both cut and uncut pinelands is a most familiar and certain phenomenon. That it should keep the land bare of young pines is as true as that former prairie areas now timbered were kept free from woody vegetation so long as the heavy grass covering was burned over periodically. The cases are identical. If one wants to see the vigor with which woody species will gain ground after the fire check has been removed, let him contemplate the tide of chaparral that is submerging the Rio Grande country.

The question would next appear to be what steps to take in order to give this reforesting energy a chance to express itself. The answer is, of course, by all means protect the seedlings from fire. This, however, does not begin far enough back. We must go back to the logging operations and change some things if the best possible opportunity is to be given for reforestation within a brief enough time to make it profitable. This would necessitate such changes as the following:

1. That not so much waste timber and tops shall be left after logging.

2. That poles and saplings shall not be needlessly sacrificed in felling large trees.

3. That young trees felled for a single cross tie or two should be left to reach a maturer growth.

4. That old trees—perhaps inferior for lumber—shall be left at sufficiently frequent intervals to insure a uniform seeding of the ground.

The question as to whether the prevention of all fires in virgin forests is wise is an open one. It is not there a question of seedlings but of damage to old trees. It is reasonably certain that the annual burning off of a light grass and pine straw débris is not destructive of sound timber in any considerable quantity (except where some act, such as blazing a tree, or some accident has exposed a wounded pitchy surface), and it certainly appears to hold in check the damage due to certain insects. Moreover, unless fires could be prevented with certainty (at present a most difficult undertaking) they would break out just when the accumulated débris of several years would give them body enough to destroy large timber. It must be said that probably the same difficulty experienced in preventing fires in virgin forests would be experienced in the case of logged-over lands where protection of seedlings was aimed at.

What, now, would be the lumberman's attitude towards such a proposition as would result from the foregoing conditions? We will assume that he, of all men, is deeply interested in securing the permanence of the longleaf forests. With circumstances of risk, taxes, market demand, and interest rates as they now are, we believe he will say he could by no means afford to so conduct his business as to give the requisite conditions for securing reforestation and consequently succeeding cuts of timber. But if the State would remove the risk of loss during reforestation and the taxes in large measure from the land in its unproductive condition, these things, together with the increased price of longleaf timber and lands which is sure to come in the future, might serve to neutralize the present demands for immature timber and warrant the sacrifice of interest in invested capital for a series of years.

It is evident that, whatever is to be done, the State must take the initiative. And it is just to its interest to do this. With it, it is not a question of immediate financial profit, but of preserving the proper balance between forests, agricultural and grazing lands. The State could not only enact and administer laws promoting conservative lumbering among pri-

vate holders; it could, and in my opinion, ought, to become the owner and active manager of all the logged-over land obtainable under reasonable terms, making of it the forest reservation upon which could be practiced a system of management looking to the restoration of the Longleaf Pine, such as would be an object lesson and stimulus to private holders. It would be all the better, also, if whatever remains of unsold state and county-school pine lands should be placed under such regulations that when our timber is sold from them it should be removed in such a manner as to leave the requisite conditions for forest renewals.

In any case, it appears to be evident that the time is ripe for our State to organize with reference not only to the longleaf forests but to all its forests whether commercial or protective. As we say now-a-days, it is "up" to Texas to do something.

FOREST CONDITIONS AND POSSIBILITIES IN TENNESSEE.

By Burr J. Ramage, Ph.D.

Dean of the University of the South Law School.

STRETCHING like a long thin piece of ribbon from the great Appalachian chain of mountains to the Mississippi River, the rhomboidal-shaped state of Tennessee, by reason of its length and its gradations of altitude, possesses topographical features unlike those of the other American commonwealths—unless one should have Kentucky in mind—and a climate of the most varied description imaginable. Largely to the influence of these natural characteristics may be traced an almost endless variety of soils, numerous navigable streams, and a majority of the species of timber to be found in the United States. For the sand and clay of west and middle Tennessee, no less than the limestone formation of east Tennessee, produce forests whose value is only surpassed by those of Georgia and the Carolinas, although the destructive system of lumbering, which has been in vogue ever since the day of the pioneer, bids fair to ruin one of the greatest resources of the State, and one too, that is the natural heritage of the public.

Legislation there is, to be sure, against the willful, causeless and wanton firing of woods and the stereotyped Arbor Day has been adopted; but little beyond this has been enacted either in the way of encouraging tree-planting, enforcing the preservation of forests, or executing laws already on the statute books. Private initiative and activity have, however, in a measure remedied some of the most glaring defects in governmental administration, and in numerous instances the farmers display unusual wisdom and foresight in such matters as the cutting down of trees and the clearing of new lands. But much remains to be done. First of all there is crying need of a more general and intelligent interest in the matter of forest preservation, and in this work we shall have to look to the patriotic press of Tennessee which has already done so much in this direction.

Any practical suggestions along these lines must be based, of course, on a comprehensive knowledge of our forest resources; but, unfortunately, this is not obtainable at the present time. No committee seems ever to have been appointed by the legislature either for the purpose of recommending desirable forest legislation or for obtaining those facts on which such suggestions must necessarily be based. Information of the nature just indicated ought naturally to embrace a forest survey, such as that recently undertaken by the State of Wisconsin, and a general description of the topography, soils, climate, drainage and river-systems of the State. It might also go so far as to include a description of

forest conditions, past and present, existing systems of taxation, the logging operations now in vogue, and what methods, if any, are adopted for the purpose of reproducing forests totally or partially destroyed.

But it would be a grave mistake to infer from the preceding remarks that nothing whatever has been done either by individuals or by the State to call attention to forest supplies as factors in the wealth of the people. For many years there has been in existence a Bureau of Agriculture, Statistics and Mines, whose annual reports throw a great deal of light on the natural resources of Tennessee. On it there could be very successfully engrafted a most admirable system of forest supervision and at the same time a saner method of enforcing the numerous laws passed for the protection of fish and game.

According to the report of this Bureau for the year 1874, there were at that time in Tennessee 13,268,789 acres of forest land, or almost one-half the entire area of the State. In the meantime, however, the enormous material development of the commonwealth, including the exploitation of its coal and iron fields, has brought about an unprecedented growth of all forms of industry, and the corresponding demand upon our forests has told sadly against their future welfare.

The list of trees of commercial importance found in Tennessee includes many species of oak, ash, beech, birch, buckeye, cedar, chestnut, wild cherry, cottonwood, cypress, dogwood, elm, fir, gum, hickory, linden, locust, maple, mulberry, pine, poplar, sassafras, sycamore, tupello and walnut. These are, of course, of varying degrees of value, and are employed for numberless purposes. Even the much-despised Black Jack Oak of the "Barrens" is not without its use, for during the Civil War it was not unusual to manufacture saltpeter from its ashes. Our once extensive cedar forests of middle Tennessee are fast disappearing before the onslaughts of the fence-builder, the basket-maker and the leadpencil manufacturer—legitimate demands surely, but little is being done to replace the trees thus taken, while the stately poplar, which is without rival anywhere, bids fair to be relegated to the least accessible portions of the State.

That something must be done is plain enough. Never was there a better opportunity for some statesman to come forward and couple his name with a legislative act covering this whole subject. For notwithstanding the fact that the bulk of our forest lands belongs to private owners, their influence on our rivers, climate, wealth and general well-being causes the forests everywhere to become a matter of public interest and concern.

Fires have been described as the greatest enemy of the forest, and this has been especially true of Tennessee forest fires. But notwithstanding legislation on the subject, we have not yet reached the point of creating a fire patrol, and our lands may still be classified as they were by the pioneers, who grouped them under the three heads: "Mountain lands, river lands and 'barrens.'" Unless a more conservative plan of lumbering is introduced, it may not be very long before the third group will alone survive. Adding to the destructive form of lumbering now in vogue the further enemies of the forest —insects and fungi—there is still the grazing question to consider. Preventive measures and intelligent treatment will come in time and do much to overcome the present lack of system; but in the meantime sheep and cattle, by being allowed to roam at large through the woods, are annually destroying untold possibilities for forest production.

It is not wise, however, to close one's eyes to facts and the truth will soon be forced upon us that our timber supply is fast being exhausted without any provision for the future. More than a quarter of a century ago a prominent citizen of Tennessee declared that "many of our finest iron fields will soon be deprived of half their value unless some legislative protection is given to the young timber." Meantime what has been the effect of this wholesale denudation of our forests upon our fields, our climate, our navigable streams?

An interesting example in practical

forestry, the first attempt in Tennessee, is being carried on at the present time on the domain of the University of the South at Sewanee. This tract of nearly 10,000 acres of hardwood is being lumbered in a scientific manner under the direction of the Division of Forestry of the United States Department of Agriculture. After a thorough examination of this tract by the government experts a working-plan was made and lumbering has begun, and is being carried on with a view of providing a steady annual income to the university, and at the same time taking care to protect and promote the future growth of the forest. During the early spring the Division of Forestry began collecting the necessary data for a working-plan on 85,000 acres of forest land in Polk and Monroe counties in eastern Tennessee belonging to Senator George Peabody Wetmore of Rhode Island. Is it not possible that these examples will bring the State to realize the necessity of a well-defined forest policy and at the same time awaken private owners to the needs of the hour?

FIRE LINES IN PINE FOREST IN PRUSSIA.

By F. Tracy Hubbard.

PINE forests are in all probability the most easily set on fire and this is especially true of those growing on sandy soil. Such forests form the chief stand of the district at Chorin, a little village near Eberswalde in Prussia. The pines (*Pinus sylvestris*) are growing in clear stand on a sandy soil, presumably the delta formation of the under ice-streams of the glacier that once covered the region. The

ROAD AND PATH ACTING AS FIRE LINES. THIS PICTURE SHOWS HOW A ROAD OR A FIRE PATH MAY CHECK A SURFACE FIRE. THE LIMIT OF THE FIRE IS SHOWN BY THE UNBURNED GRASS.

stand is especially endangered by the main line of railroad from Berlin to Stettin, but despite these conditions there have been very few serious forest fires in it. That there have not been more is due solely to the excellent system of fire lines which cut up the stand into small sections and successfully prevent the spreading of any fire that may start.

SETTING A BACK-FIRE ON THE WINDWARD SIDE OF A ROAD.

Adjoining the line of the railway, and running parallel to it, is the main fire line. This is a strip, about thirty-five feet wide, on which a small number of trees are kept as "spark-catchers." The trees used for this purpose are of various genera, birch, beech, pine, etc., but the forester in charge gives the pine the preference, as it is evergreen and consequently of greater service in the early spring when the danger from fire is greatest. The trees are kept clear of branches for at least two to three feet from the ground; and the ground covering is of grass or some low growing green herb. All dry material and all weeds are carefully removed. These precautions are taken to prevent the fire from making rapid headway. Back of the strip just described is a shallow ditch some four feet in width which runs parallel to the track. This ditch is very carefully freed of all growth whatever and from two to three times in the course of the spring and summer the earth is loosened so that the fresh broken soil is always exposed. The strip and ditch together form the regular form of fire line along railroads and are excellent in preventing large fires. Suppose that a spark alights in the ground covering and this takes fire; there are no dry lower branches nor any weed growth which can furnish fuel to the fire so that it runs but slowly. If the fire is not discovered and put out it finally reaches the ditch and there, not having previously attained any size, it is unable to get across and therefore burns itself out.

In those localities which are most endangered by the trains, a further system of fire lines is employed. This extra protective belt occurs back of the beforementioned ditch. A section of the normal stand is divided, by four-foot ditches similar to the first, into squares with a side of about thirty feet. The area embraced within these squares is kept free from all such things as fallen branches, dry grass and the like. The ditches are swept clear of all pine needles and other easily inflammable stuff and the ground is kept bare by hoeing. This extra protective belt prevents the spread of any fire which starts within the ordinary fire line beside the railway, and is only a necessity in especially exposed localities where sparks are liable to be blown beyond the ordinary lines.

A FIRE LINE ALONG A RAILROAD WITH TWO CLEARED SPACES SEPARATED BY A DOUBLE ROW OF TREES INTENDED TO CATCH THE SPARKS.

In the interior of the stand still another protective system is employed. This consists of a series of roads which intersect the stand forming a sequence of squares the sides of which are about seventy yards. These roads are twenty feet in width; are ploughed up each spring and are then

sown down with Ceradella, a low-growing Spanish plant belonging to the pea family (*Leguminosæ*), and similar in habit to the common vetch (*Vicia sativa*). Ceradella is a very close grower and seems to thrive on all soils and to keep fresh and green in the worst droughts—consequently it is eminently fitted for the prevention of the spread of ground fires. Such roads planted with Ceradella serve to check intra-stand fires before they obtain great headway, and in case a fire has got beyond control they give the fire fighters a point from which contra-fires can be started.

Such is the complete system of firelines in use in the district and by means of them a stand very exposed to danger from fire has escaped all large fires for a long period of years. The railroad bears a large part of the expense of the formation of the primary fire line as well as its entire cost of maintenance: the secondary belt and the fire roads are paid for by the Department of Forestry.

For many of the details contained in the foregoing I have to thank Herr Forstmeister Dr. Kienitz, who has charge of the district and who very kindly accompanied me through his interesting Revier.

OUR WANING FORESTS.

DR. W. SCHLICH, the well-known forest expert, in a recent address before the London Society of Arts predicted a positive timber famine in the near future unless systematic measures for increasing the world's supply be speedily adopted. He pointed out that the use of wood, in spite of its replacement by coal as fuel and by steel in construction, was steadily increasing. The per capita consumption in the four chief countries of Europe is now fourteen cubic feet each year, and in a few years will probably reach twenty cubic feet. For this increase the use of wood in paper making seems chiefly responsible. The steady rise in prices, especially of coniferous woods, in spite of much cheaper transportation, shows that the world's supplies are rapidly diminishing.

Only five out of eighteen European countries export more timber than they import. Scandinavia and Russia are the principal exporters. The limit of production in the former seems to have been reached. Russia still has large forests, but domestic demands are rapidly increasing, and an exportable surplus can not long be depended upon.

The North American supplies are visibly declining. China has no timber to spare, and that country, when developed on modern lines, will be an importer rather than an exporter. There remain the rest of Asia, South America, and Africa as sources of supply. But these do not furnish any considerable amount of the coniferous woods, which are most in demand. Dr. Schlich therefore concluded that the danger of a deficient supply of coniferous wood was practically at hand, and that deficiency of all kinds would soon occur unless remedial measures were adopted.

The remedy is easy, although time is required for its application. It is, as Dr. Schlich pointed out, to cultivate timber upon waste land, just as other crops are cultivated upon more fertile soil. In Great Britain alone there are 25,000,000 acres of such lands. One-quarter of this area, Dr. Schlich asserted, would make the country independent of foreign supplies of timber. The same remedy would restore the declining timber industry of the United States.

That this remedy will have to be adopted soon is evident, for natural growth can no longer keep pace with demand. The country that first engages in systematic timber cultivation on a large scale will do much to assure its own perpetuity as a nation. That Spain's political and industrial decline dates from the practical wiping out of her forests is a fact from which it is easy to draw the lesson.

THE PROPER PROFESSIONAL TITLE FOR FORESTERS.

By Dr. John Gifford.

NOW that forestry has already become an important profession in this country and that two of our leading universities are turning out professional foresters, the question of title and degree is an important one. The following is written for the purpose of inviting discussion *pro* and *con*.

The term *forester* is generic in nature. It should include as in Germany, India and elsewhere men who do forest work whether they are graduates of forest colleges or not. A man may attend a forest college for one year and having had already a good general training may be able to go into the forest and do as well, if not better than a graduate in forestry. He is entitled to the title of Forester, but not of course to the degree and title which the institution confers upon its graduates.

This article refers only to the title which graduates in forestry should receive. The term *forester* as a general generic title cannot be improved upon. It seems to the writer that the terms Bachelor in Forestry (B.F.), Master of Forestry (M.F.), and Bachelor of Science in Forestry (B.S.F.) are for several reasons objectionable.

I have suggested therefore the title of Forest Engineer (F.E.) for the following reasons: Forestry is a profession similar to civil and mechanical engineering and being a new subject in this country, should receive a distinct degree. By establishing the title and degree of Forest Engineer, it will aid in the establishment of the profession of forestry on a footing with other similar professions such as civil, sanitary, and mechanical engineering.

The title of Forest Engineer is not new and is not an invention on my part. The use of the title "ingenieur forestier" is common in France, Belgium, and Roumania. Foresters in Spain and in Spanish countries including Cuba and the Philippines are known as "engenerio de montes," or engineers of the forests. The young foresters who go to India from the Royal Engineering College at Cooper's Hill, England, of which the college of forestry is a part, are known as "certified engineers in forestry."

Some object to the title "engineer" because it is loosely used in this country even for engine drivers. It would be difficult however to find a more appropriate term than "engineer" for foresters. It comes from the Latin "ingenio" which means "to produce," "to engender," "to propagate." This certainly applies to the forester, whose work is the formation and care of forests.

Even in its American sense the word "engineer" is quite applicable for fully one-half of the forester's work is strictly engineering. He must build roads, even railroads, sawmills, dams, flumes, timber slides, and a host of similar constructions. He must also do survey work. Before he can measure the amount of timber in a piece of land he must be able to measure the land. He must do topographical work and map making.

Now is the time to adopt such a title. It should, however, be strictly confined to the graduates of forest colleges and to those persons upon whom these colleges may honorarily confer the degree. The degree F.E. is short, to the point, professional in nature, and already in use in several parts of the world and even in a part of our own possessions. It is familiar, more or less, to the Spanish-speaking peoples of Central and South America.

In a profession of this kind where the nature of the work is practically the same in quality and quantity throughout the world the sooner a universal title is established the better.

The title of Bachelor and Master should be confined to academic work. There should be no grading of Bachelor and Master in professional degrees. When a man becomes a Doctor of Medicine and Surgery that settles it. In such cases the Bachelor and Master titles are useless. When a man becomes a C.E. or M.E. that

should settle it. He is then fit, if a graduate of a good college, to practice his profession anywhere. The same should be so in forestry.

The writer hopes that both the Yale Forest School and the New York State College of Forestry will do away with the titles of Bachelor and Master of Forestry and both confer the degree of F.E. (Forest Engineer). It will sound strange at first but will soon become as familiar and as common as C.E. and M.E. are to-day.

TIMBER ESTIMATING.

By H. B. Ayres,
U. S. Geological Survey.

TIMBER estimators have, as a rule, been reticent concerning their methods. Their employers who buy and sell on their estimates, do not ask them.

As long as those immediately concerned are content, there is no need of literature on the subject, but when the value of the property of people inexperienced in sales by estimate is at stake and the owners have no personal knowledge of the record of the several estimators, they have a right to some idea of the manner of doing the work.

The fundamental principles of estimating are very simple, and consist in ascertaining the number of trees, their dimensions and the percentage of merchantable timber in them. The measurement of a tree is very simple and of little importance.

The principal difficulties of estimating are: 1. Locating the land to be estimated. 2. Determining the number of trees. 3. Determining the average size of the trees. 4. Determining the percentage of defects. 5. Determining the proportions of the several grades of lumber.

In locating land the most intricate problems of land surveying may arise even where the land has been subdivided into sections or when subdivided into so-called forty-acre tracts. In such cases the adjustment of errors and the reëstablishment of lost and obliterated corners require a high degree of technical skill.

In practice, lines are run and location is kept by compass and pacing, or by transit and chain according to the accuracy desired and the difficulties of the ground.

The counting of trees may seem a very simple matter and under some circumstances it is. When all of a small group of trees are in view from one point it is easy to count them but a large tract of dense timber or a few timber trees among dense saplings are different problems.

The defects of timber whether from rot, crooks or worm holes are matters of close study. They are to be familiarized (though never mastered) only by long study not only in standing timber but also in seeing defective logs put through the mill.

In estimating grades of lumber that may be manufactured from the timber in question, the highest skill is necessary. In considering methods of estimating, the differences of general forest conditions are also to be borne in mind. That is, whether the forest is broken by openings such as lakes, swamps, meadows, brush land or burns; whether it is young and thrifty or old and defective. In the application of European methods used in estimating cultivated uniform forests there, to primeval or natural or irregular forests here, there should be great caution; for uncultivated forests rarely have such a uniform stand. That one acre may represent a forty-acre tract or that any portion of a large forest can be chosen to represent the whole, is a very serious question. In this fact lies a difficulty inexperienced men are apt to stumble over. The selection of representative tracts to be measured or closely estimated to serve as a factor for the whole tract is a problem the most skilled estimators are reluctant to undertake.

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The Denver Meeting. The summer meeting of American Forestry Association, announced for Denver, July 10–12th, has been postponed, owing to the calling off of the meeting of the National Irrigation Association. The Association will, however, meet in affiliation with the American Association for the Advancement of Science, at Denver, Colorado, August 27–29th inclusive. The committee in charge hope to make this meeting one of the best in the history of the Association, and a large attendance is expected. The full program, including a list of the speakers, will be published in the July number of the FORESTER.

The Training of Government Foresters. When active field work in the Division of Forestry began, nearly three years ago, one of the principal obstacles to its success was the lack of men. Trained foresters in anything like sufficient numbers did not exist in this country and for many reasons it was unadvisable to import them from abroad. Nothing remained but to educate them. For that purpose, young men, chiefly college graduates, who had determined to make forestry their profession, were taken into the Division as student-assistants, and sent to the field under trained foresters to learn something of their business by practical work. At the end of the field season some of these men returned to their work in the universities, some came to Washington to continue with the Division.

In addition to the regular work, which was made as instructive for these men as the necessity for accomplishing as much as possible with a limited appropriation would permit, weekly meetings were held, at which papers on various phases of forestry were read and discussed. These meetings were made to cover not only subjects of technical forestry, but also a sufficient range of allied topics to give the student-assistants a right point of view and a just perspective in forest work. The resources of Washington in scientific men and material were widely drawn upon, and the series of talks at these meetings was such as could not have been held in any other city. The attendance for the first year was from 15 to 30; this year it has increased to from 40 to 75. During the present season the charge of the meetings has been taken over by the Society of American Foresters.

Some of the subjects and speakers were: "Forest Fires in New Jersey," by Henry S. Graves; "The Methods and Aims of Hydrography," by Frederick H. Newell; "Alaskan Forests," by C. Hart Merriam; "Forest Growth and Sheep Grazing," by Frederick V. Coville; "Forest Management in the Dehra Dun Conservancy of British India," by F. E. Olmsted; "Forest Problems in the Southern Pine Belt," by J. A. Holmes; "Commercial Forest Plantations in the Middle West," by William L. Hall; "Forests of the Olympic Peninsula in Washington," by Henry Gannett.

The Society of American Foresters numbers among its members two Presidents of the United States, one Vice-President, four Cabinet Officers, and practically all of the professional foresters in the United States. Its meetings may therefore be expected to attract speakers of reputation and experience. Chas. D.

Walcott, Arnold Hague, and W. J. McGee have agreed to give papers in the future, and talks are expected from Vice-President Roosevelt, Secretary Wilson, and others.

During the last summer 65 student-assistants were in the field. During the winter an average of about 25 were at work in the office. Most of these men will go from the Division to a forest school and will return to the Government work after thorough training.

Not the least of the results of these meetings has been the creation of a strong *esprit de corps* among foresters in Washington.

Lumbermen and Forestry. Perhaps the most encouraging sign of the day in forest matters is the growing interest of lumbermen. From a natural distrust in the beginning of the forester and his methods, the average lumberman has come to realize that the practice of forestry is good business, and the number of lumber firms who are handling their woodlands on the lines of scientific forestry is rapidly increasing. The lumber trade journals are devoting considerable space to forestry, and we quote the following from an editorial in a recent issue of the *Lumberman's Review* as showing the position of the lumberman:

"In the course of a recent lecture on 'Forest Problems in the United States,' delivered by Prof. H. S. Graves, of the forest school of Yale University, the statement was made that the forests of the United States comprise ar area of 1,100,000 square miles, of which less than one-third is under government ownership. Between one-third and one-fourth of the private forests are in small holdings of from five to ten hundred acres. The most difficult problem in connection with the American forests is the management of the 250,000,000 acres of forest, land in private ownership as a speculation. Here again we find a forest expert directing special attention to the commercial side of the problem of forestry, and it is worthy of mention that Professor Graves is of that modern school of foresters who, within the past ten years, have brought forest theories, as held in this country, into consonance with the practical commercial ideas held by the timberland owners and lumber manufacturers. Sentiment has its proper place, but it has never yet been mixed up with the manipulation of a large timber tract by a lumberman. The sentimental side of forestry has been swept aside during the past ten years by the rising tide of practical forest economics. Few lumbermen will place the needs of the next generation paramount to their own present success and comfort. They will strip their tract in two years unless they are convinced that, as a business proposition, they should simply cull out the mature timber each year, treat the tree as a crop, and reap an annual harvest from their holdings. This is precisely what the forest schools at Yale and Cornell and the Division of Forestry at Washington claim an ability to demonstrate."

NEWS, NOTES, AND COMMENT.

Government Forest Exhibit at Buffalo. The government forest exhibit prepared by the Division of Forestry, U. S. Department of Agriculture, for the Pan-American Exposition at Buffalo, N. Y., consists entirely of a photographic display. This display includes sixty-two colored and uncolored transparencies, ranging in size from 20 x 24 inches to 48 x 60 inches. Two of the transparencies are 4 x 10 feet, the largest ever made.

The subjects illustrated are: Lumbering, and its effects on forest reproduction; the effects of forest fires on forest land, and the relation of such denudation to the flow of water in streams and the supply of water for irrigation. The principal types of trees are illustrated, to show

the size and lumber production of various wooded regions in the United States. The value of preserving certain types of protective forests on watersheds, for the conservation of water important to adjacent areas of agricultural lands is also illustrated.

A special feature of the display is the illustration of individual trees of the mammoth Sequoia, the giant Red Firs and White Firs and Sugar Pines of the California forests. Typical agricultural and forest lands in the East and West are illustrated on a large scale showing the principal protective agencies of natural adjacent mountain forests and planted shelter-belts of forest trees. The regions and subjects from which these illustrations were taken are representative of the principal agricultural and forest sections of the United States.

In addition to transparencies, maps show the distribution of the principal lines of work carried on by the Division of Forestry. Charts show the history, size and location of the United States Government reserves, National parks, and also State forest reserves, parks, and preserves.

Improper Cutting of Indian Pine Timber.

Gen. G. C. Andrews, Chief Forest Fire Warden of Minnesota, has given to the press the following statement relative to cutting "dead and down" pine on the Chippewa Indian reservations:

"A recent visit to two of the Chippewa Indian reservations satisfies me that there are strong grounds for the common impression that the Indians are being wronged by the cutting of pine timber under the "dead and down" timber law and that the way this law is administered offers a premium for causing forest fires. There are 7,000 Chippewa Indians, in a dozen different bands, scattered for 200 miles from east to west in northern Minnesota with many settlers in their vicinity, and it is very important that they have no good cause of dissatisfaction. Their pine forests are worth $8,000,000. Under the existing treaty this pine on the ceded reservations must be sold in forty-acre tracts, but from various causes such sale is held in abeyance. Ordinarily, once in six or eight years, from unusual blow-downs of pine or from fire, there would be occasion for cutting some million feet of pine under the "dead and down" law. But through eagerness of people to get the pine the Interior Department, which has good intentions towards the Indians, has been so misinformed as to permit extensive lumbering operations under the law for successive years.

"I went and looked at the pine logs, probably 20,000,000 feet, partly in boom and partly in piles at Wolf Lake and Pike Bay on the reservation, which includes Cass Lake, and at Elbow Lake in the northeast part of White Earth reservation, and think that 70 per cent. of all I could see were sound and merchantable. There

were enough that were unsound and worthless or that were wholly blackened by fire to apparently lend bad character to the whole. In this system of lumbering the logger contracts to cut and haul and boom in water whence they can be floated to a mill or to pile near a railroad the "dead and down" timber. He is paid so many dollars a thousand for doing this, and if his contract is a good one it is for his interest to cut as much as possible. The numerous substantial log houses at the camps and the roads made and bridges built in the vicinity of the operations as well as the logs themselves all betoken extensive lumbering. Having reached the place of transportation the government sells the logs to various lumbermen who will pay the highest price for them. It is the universal opinion that under this system it is impossible to prevent the cutting of green and sound timber. It is also the common opinion that fires are set in order to make a cause for cutting timber in this way. I am confident that at least 50,000,000 feet of sound timber has been cut the past winter, and judging from hearsay about 100,000,000 feet has been cut. Of course I have not the means of knowing whether the Indians will receive the full value of the pine, but my impression is that they will not receive its full value within from $50,000 to $100,000. However that may be, this is certain that under the guise of cutting "dead and down" timber a great deal of sound timber is being cut, and the whole business has a character of fraud and tends to excite in the Indians discontent, disrespect for the government and for white people generally.

"There is a remedy for this abuse, and it ought to be applied speedily. The administration of the Indian pine forests in Minnesota is not a local but a national matter. It concerns the people in the other States as much as it does the people in Minnesota, for it involves the honor of the United States Government. These lands should be administered on forestry principles; by which is meant that the mature trees should be cut and marketed as rapidly as practicable and the young trees left to grow, and all protected from fire. The tops and branches would not be left as now a menace in dry weather to the safety of the remaining forest. There are plenty of young Americans already trained in theoretical and practical forestry and who would be glad to take charge of these forests and would take professional pride in managing them in an economical manner. The government could do nothing better to inspire the respect and good will of the Indians than to place these pine lands under scientific forestry management.

Diminution in Cut of White Pine.

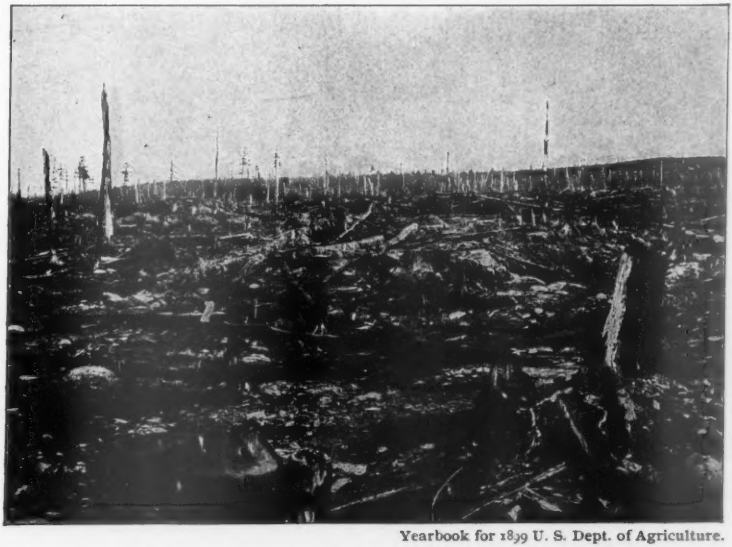
"The permanent decline in the pine lumber product of the sawmills of Michigan, Wisconsin and Minnesota is graphically portrayed by the report of the output of these mills for 1900, the comparative table giving the product by districts and the grand totals for a series of years. These statistics have now been compiled for twenty-eight consecutive years, and form the only complete and reliable figures existing in regard to any grand department of the lumber industry. They have been secured from the mill men themselves and their completeness of detail is convincing.

"The last year the product passed the eight billion mark was 1892, and now it has dropped below five and a half billions. The grand totals for the last eleven years, in round numbers, are as follows: 1890, 8,597,000,000; 1891, 7,880,000,000; 1892, 8,594,000,000; 1893, 7,326,000,000; 1894, 6,821,000,000; 1895, 7,050,000,000; 1896, 5,726,000,000; 1897, 6,233,000,000; 1898, 6,155,000,000; 1899, 6,056,000,000; 1900, 5,485,000,000. The exact total for last year is 5,485,261,000 feet.

"During the last two years there has been every inducement for the mills to turn out a heavy product; and yet there was a slight falling off in 1899 as compared with 1898, and a heavy decrease in 1900. Every resource was strained to make a heavy output, but without result,

Yearbook for 1899 U. S. Dept. of Agriculture.

THE EFFECTS OF FIRE AFTER LUMBERING IN NORTHERN MINNESOTA PINE FORESTS.



Yearbook for 1899 U. S. Dept. of Agriculture.

FOREST LAND IN MINNESOTA DEVASTATED BY FIRE. THESE TWO VIEWS WILL EXPLAIN TO SOME EXTENT THE DIMINUTION IN CUT OF WHITE PINE.

except to prove that at last the closing years of the White Pine industry of the Northwest, as one of great magnitude, are at hand. With such results it must be admitted that the product will decrease annually until it reaches a point where by the adoption of preservative forestry methods it can permanently be maintained.

"The decrease is not confined to any particular part of the White Pine territory, but is seen in Minnesota as well as in Michigan. In the comparative statement it is seen that west of the Chicago district the total for 1900 was 4,077,000,000 feet, against 4,401,000,000 in 1899. This includes the mills west of Lake Michigan except those along the Green Bay shore and the upper peninsula of Michigan. Every district in this territory but two shows a decline. Even Minneapolis and upper Minnesota cut less in 1900 than in 1899. The Mississippi River below Minneapolis, however cut 562,000,000 feet against 504,000,000 in 1899, and the Wisconsin valley 613,000,000 against 542,000,000.

"The mills in the Chicago district—including those on Lake Michigan and in the upper peninsula of Michigan—cut 1,056,810,000 feet in 1900, against 1,150,721,000 in 1899. The heaviest percentage of decrease was naturally found with the mills on Lake Huron waters.

"The grand total of stock on hand at the mills or primary points on December 31st last was 2,839,705,000 feet, against 2,728,271,000 at the same date in 1899, 1,494,739,000 in 1898, 3,915,558,000 in 1897, 4,053,937,000 in 1896 and 4,180,360,000 in 1895. It is to be noted that there was a decrease of 58,000,000 feet west of the Chicago district, where is produced three-quarters of the entire output. There is thus shown a heavy falling off in shipments for 1900 compared with 1899, and yet stocks are nowhere near the old time standard, either in actual quantity or compared to the output.

"The total shingle output of the pine and hemlock mills of the Northwest for 1900 was 2,400,000,000, against 2,899,000,000 in 1899. This reduction followed

A WHITE PINE FOREST IN PENNSYLVANIA.

that in lumber, but shows that the output of shingles is holding up much better than that of lumber. It is about the same as that of 1895 and 500,000,000 larger than that of 1896. The territory west of the Chicago district produced 969,000,000 shingles in 1900, the Chicago district 917,000,000 and the eastern part of the field 514,000,000.

"The statistics of hemlock production will be a surprise to everyone and will fully explain the reason for the adverse market conditions during most of last year. The output for 1900 was 1,166,284,000 feet, against 868,410,000 feet in 1899—an increase of 297,874,000 feet. The stock on hand, however, increased in still greater proportion. There was reported on hand December 1, 1899, 287,920,000 feet; while December 1, 1900, the stock was 622,312,000 feet—an increase of 334,392,000 feet. But the producers have already heeded the warning, and the log input of this winter and the hemlock lumber product of the year will be heavily decreased, and probably by next fall the balance will be restored."—*American Lumberman.*

A FOREST FIRE ON THE YUKON RIVER, ALASKA.

Destruction of Forests along the Yukon. A letter was recently received from a well known member of the American Forestry Association, now in Alaska, in which the destruction of forests along the Yukon is alluded to:

"There is great need for some action on the part of the Government by which the use of timber in the interior can be put under regulation and reduced to a system. I took a trip down the Yukon River last summer and somewhat to my astonishment I saw that the steamboat companies obtained fuel anywhere along the route wherever it could be found, without let or hindrance. The companies either hired men to cut the wood, or more generally I believe, wood choppers cut and pile it on the bank of the river on their own account, and then sell to the companies. In some places the wood is already becoming scarce, and if this policy is continued it will not be many years before the fuel within convenient reach of the river will be gone. In some places wood is so plentiful that this will do no harm, but in other places it is scarce; and when we consider the importance of the timber to the miners and the settlers, it appears to me that something should be done to regulate the use of the timber and perhaps the American Forestry Association will be the proper agency through which this matter could be called to the attention of the authorities.

"Piled on the river bank at convenient places the wood costs the steamboat companies from $5.00 to $10.00 a cord, according to its scarcity, and some of the larger steamers use a hundred cords every twenty-four hours. It takes about six days to make the trip from Dawson to St. Michaels, and about twelve days to make the trip from St. Michaels to Dawson against the current. Now with some fifteen or perhaps more steamers on the river an approximate estimate of the amount of fuel consumed by the steamboats can be arrived at. I was told that an average fuel bill of one of the larger steamers was about $500 a day.

"Fuel, of course, is essential to steamers which ply on the river, and I would in no way intimate that the companies should be prohibited the use of native timber for

fuel; but I suggest that it should be regulated by the Government for the best interests of all. Timber growth is so slow in these higher latitudes, that when a region has once been depleted there is no prospect of its having usable timber again for generations to come."

Eucalyptus for Cuba. Dr. John Gifford, of the New York State College of Forestry, has just received from France, through J. M. Thorbum & Co., a consignment of Eucalyptus seeds for the Sanitary Department of the City of Havana. These seeds will be sown by Mr. Eben White, under the direction of Dr. V. Havard. As soon as the young trees are of sufficient size they will be planted about the city with the hope of improving its sanitary condition thereby. Seeds of the following species have been received: *E. amygdalina*, *E. resinifera*, *E. rostrata* and *E. viminalis.* Other species will be tried so that the kinds best suited to the climate may be known. Owing to the scarcity of wood in central and western Cuba, species which yield the best timber have been selected. *E. resinifera* has been extensively grown in southern Europe and is known as "Australian Mahogany," while *E. rostrata*, because of its usefulness to the farmers of South Africa, is there called "The Farmer's Friend."

Owing to the great demand for telegraph and telephone poles, fence posts and rails and tobacco poles in Cuba, and to the rapid growth of several of these Eucalypts their propagation ought to prove a great financial success.

Mr. White reports that a few which have been transplanted are growing well. A bundle of willow cuttings was also sent by Prof. Rowlee from the Cornell University Salicetum. It will be interesting to note how some of these northern plants will grow in a tropical climate.

Paper from Turf. "Consul Mahin, of Reichenberg, under date of July 7, 1900, says: According to the business columns of a Reichenberg newspaper, an Australian manufacturer, in his search for a cheap raw material for paper making, has successfully experimented with turf. It is alleged that from the cleaned and bleached turf fibers he produces a remarkably durable paper substance. This method is said to have been patented in various civilized countries and to be meeting with gratifying success. Paper of various kinds, pasteboard, and paper boxes are now made out of turf and are declared to be of good quality and to have great power of resistance."—*Consular Reports, October.*

Forest Fires of the Past Month. Since the May number of the FORESTER went to press, additional forest fires in nine states have been reported. Following is a record of of the more destructive fires reported:

Pennsylvania.—Near Bradford many oil derricks were burned and considerable timber land burned over by a forest fire. At Austin a large amount of valuable timber and bark was destroyed on May 7th, and the railroad shops and mills were closed in order that the men might assist in checking the flames. In Somerset County a fierce forest fire broke out on May 1st, and burned over a large area of timber; many sheep were burned.

Montana.—On May 5th a large forest fire was discovered near Essex. It broke out in a tract of valuable timber and as the snow was gone great damage resulted.

New Jersey.—On May 5th forest fires were burning in nine sections of Atlantic County. Hundreds of men were needed to fight the fire and in addition to the loss of buildings and fences, fully $100,000 worth of fine timber was destroyed.

Tennessee.—Near Kingsport, on May 12th, fires broke out and caused great damage to timber and farm property. Many fences were burned and the crops now exposed to stock are suffering greatly.

Massachusetts.—A fire at Holden on May 7th, destroyed 400,000 feet of lum-

ber, 700 cords of wood besides burning over many acres of young timber.

New York.—On Long Island south of Wading River, a recent forest fire burned over 2,000 acres of oak and chestnut timber. Dr. M. B. Baldwin of Wardencliffe, was caught in the path of the flames and burned to death.

Nebraska.—At Hyannis a recent furious fire swept the forest ranges of that section for three days. The flames entered the best cattle district of the State, and a space of about 100 miles in length and from 10 to 40 miles in width was totally swept of hay and dry prairie grass that was needed for cattle feed. In consequence many ranchmen have no feed left for their cattle and there is likely to be a heavy loss of stock.

Maine.—A fire which damaged timber to the extent of $1,000 was reported in Enfield on May 9th.

Wisconsin.—Forest fires in Wisconsin at this season are unusual but a recent series of conflagrations have resulted in serious losses to lumbermen. At Marinette 500,000 feet of logs belonging to the Bay Shore Co., were burned. Near Mellen another lumber company has suffered a loss of 1,200,000 feet of logs. The Wisconsin Central trains could not pass through the burning territory. A three-span bridge over Trout River was destroyed.

New Fields For Rubber.

"In these times of electrical development the world's supply of India rubber becomes a serious question, which is in no wise lessened by the fact that large quantities of this product are being used in the manufacture of tubing for the air brakes, with which all first class railways are equipping their rolling stock, and by the immense demand caused by the manfacturers of rubber tires for carriages and bicycles. The late James G. Blaine, in his day, when these industries were in their infancy, so to speak, was able to peer far enough into the future to see that the supply then in sight would not be sufficient to meet the demand.

"During his term of office as Secretary of State he appointed J. Orton Kerbey, an electrical expert, as well as a newspaper correspondent, as consul to Para, Brazil, charging him to make an examination of the source of supply of rubber along the banks of the Amazon River, from which the main part of the rubber used in the United States came. Mr. Kerbey has twice crossed equatorial America by the Amazon and the Andes in a search for new rubber lands, and while he has been successful in finding what he was in quest of, the forests in which the rubber trees are located are practically inaccessible. This, coupled with the scarcity of labor, and the unreliability of the concessions made by the governments in the South American countries, renders the prospects for an increase in the supply from this source extremely precarious.

"Mr. Kerbey looks to the Philippines to supply the deficiency that threatens, as a result of the enormous consumption of this product. The climatic conditions in the Philippines, he says, are favorable to the rubber tree, while the fact that the transportation of the product can be made from the source of supply to this country in ships, instead of having to be packed over long distances, as is the case in South America, will make the Philippines the sourse of supply in the future. The freight will not be so high, notwithstanding the longer distance, and there will be no export duties to pay, as the islands are under the United States government.

"In view of the fact that Milwaukee capitalists are becoming interested in rubber culture in Mexico, the statement made by Mr. Kerbey, is of peculiar interest here. 'A rubber forest is more valuable than a gold mine,' he says. 'Gold grows in the trees of a rubber forest; all that is necessary being for the native gatherer, with his little hatchet for a wand, to enter the jungles, to tap the tree, and the liquid gold flows into his coffers. A gallon of milk or sap coagulates into a pond of crude rubber, worth $1 in gold coin in any market in the world.

"'This increasing demand for rubber

for tires or insulation has resulted in the wanton destruction of all accessible forests. In the desire of the native to become suddenly rich, they have killed the Brazilian geese that lay the gold eggs.'"—Milwaukee *Sentinel*.

Lectures on Forestry at Univ. of Chicago. Dr. B. E. Fernow, Director of the New York State School of Forestry, Cornell University, will deliver a course of lectures on forestry at the University of Chicago during the summer quarter.

Forestry for Indian Reservations. Mr. H. B. Ayres, of the U. S. Geological Survey, has the following to say in regard to the necessity for a more intelligent handling of the woodlands on our many Indian Reservations:

"Looking backward upon successful innovations we wonder they were not introduced before. So we will wonder why forestry was not sooner applied to the Indian lands. Those entrusted with the care of these lands may take the backward look with some serious regret, for they may see how such trusts might have been administered more wisely. The effects of forest policies are slow in appearing, but sufficient time has now passed since Indian Reservations were established to show the contrast between the effect of no policy whatever, as in the primeval forest before being used as Indian Reservations, and the effect of unrestricted use and misuse of the forest since the reservations have been established.

"Deterioration in forest condition is noticeable in proportion to the population using the forest indiscriminately. Near the Indian villages on the reservations, land once well timbered is now depleted by the Indians cutting fuel, fencing, and house logs; girdling trees that they may yield dry fuel; removing the bark from pine that 'pitch wood' may form for kindling fires; peeling birch trees for canoes, torches and kindling bark. All this and other cutting is done whenever and wherever the Indians themselves choose.

"Fire is used by them quite as recklessly as the axe. Some Indian boys can hardly pass a bunch of dry grass or brush without starting fire in it, and the men commonly burn over the grazing and hunting grounds and often the berry patches, to kill the seedling trees and the brush.

"By these practices the more densely populated parts of the forest lands on Indian reservations are being reduced to brush and barrens, while the remote and timbered lands remain unused, with mature timber wasting, while the Indians need the employment and the constant income which systematic cutting and marketing would afford.

"The once vigorous primeval forest (though never as productive as the ideal cultivated one) is reduced from a value (quite commonly $50 to $100 per acre) to clay brush land worth a nominal figure per acre, or to sandy barren worth nothing.

"The better way would be to place the Indian forest-lands under such management that, while a supply of needed material could be cut, such cutting would be done under supervision in such a manner as to improve rather than injure the forest, whether the cutting be for local use or for sale in the lumber market. At the same time thorough fire protection should be provided.

"The peculiar fitness of forestry to the communal lands or to the uncultivated, allotted lands of the Indians is shown by the experience in selling such lands, or the timber from them; for the resulting funds have almost invariably been misused by the Indians, because of peculiar customs in sharing personal property with relatives, and the usual lack of inclination to save money. A moderate constant income, such as may be expected from the forest, would suit the needs of the Indians admirably.

"The need of employment near their homes by the Indians is great, and would be supplied by their use as rangers, laborers, and foremen, according to their capacity.

"The antagonistic influences against such a policy are due to the inertia of customary methods of stripping the forest regardless of future crops."

Farmers to Protest against Grazing.

"A delegation of Yakima County farmers called on D. B. Shellar, superintendent of the Rainier forest reserve recently with the intention of explaining the exact situation of the Cascade watersheds. He was engaged at the time in making allotments for grazing privileges and the meeting was postponed. Farmers will prepare petitions and circulate them among the actual settlers of lands in the county, asking the Secretary of the Interior to close the reserve against sheep grazing. This is done as an act of necessity for the protection of the people having lands irrigated from the snowfall of the eastern slope of the great Cascades.

"Applications have been filed by 90 sheepmen, asking for grazing for 243,266 sheep, and 65 cattlemen have asked for the privilege of grazing 5,056 head of cattle. In addition to this five sheepmen ask for permission to graze 24,700 sheep on the Washington reserve. Formal leases have been made and will be sent to the city of Washington for approval. It is understood that the grazing privileges will begin about July 1, and continue for three months. The superintendent of the reserve introduced three rangers, who are employed at $60 per month to keep all others off the range excepting those having the official sanction.

"The farmers, who represent about 90 per cent. of the producers of Yakima county, state that the time has come when conditions must change. They did not object to sheep grazing in the years past, as there were only a few and the harm done was not noticeable. Now, they say, the number has increased and the dangers have become so great that the sheep industry has to be recognized as a menace to the peace and prosperity of the agricultural classes.

"'No one has any desire to kill the sheep industry,' remarked a prominent farmer to *The Spokesman-Review* correspondent. 'We merely want our homes, our crops and farms protected against a possibility of drouth. The way the watersheds are being destroyed and the grasses eaten out the danger point is near at hand. The upper creeks, comprising the Wenas, Cowiche and Ahtanum, have been failing for the past six or eight years. Every man knows this, and further, every farmer in those valleys knows to what extent litigation has resulted over the shortage of water, caused by denuding the forests and headwaters of the stream by grazing. Either the 90 sheepmen must cease using the forest reserve or the farmers of Yakima county must change locations to some other country.'

"This seems to be the general sentiment of agriculturists who have given the matter of protecting the forest reserve thought. The water has been decreasing year after year by reason of the range and forests being destroyed. If the watershed is preserved as in former days it is believed there is room for a population of 100,000 farmers and dairymen in the Yakima valley. If the watershed is destroyed no additional farms can be maintained very long."—Spokane, Washington, *Spokesman-Review*.

AMONG FOREIGN AND AMERICAN PERIODICALS.

The May issue of *The Journal of the Franklin Institute* contains a short but interesting and instructive article on the oil of walnuts. The oil of walnuts which is made in Europe from the nuts of the English walnut is chiefly used by artists for paints, because it dries into a varnish which is less liable to crack than linseed oil varnish. This oil is however extensively adulterated. Mr. L. F. Kebler, the author of the article, finds that the oil of the Black Walnut is quite as good. An artist on using it pronounced it a very satisfactory article for fine painting. The oil of the English Walnut is used in the Black Forest as a substitute for olive oil. As a

dressing for salads it is quite palatable; in fact, because of its nutty flavor many persons are quite fond of it.

Razoumofskya pusilla, the small mistletoe, which is parasitic upon the Black Spruce and which has been regarded so local in its distribution and so rare is really quite common and destructive over broad areas in the North. Prof. C. F. Wheeler reports in the "First Report of the Upper Peninsula Experiment Station, Michigan," that it is common in nearly every swamp in northern Michigan, and that in some of these swamps nearly every tree had been killed. Since its discovery in bloom near Panther Pond late in April, by Mr. Wm. Howard, one of the students of the N. Y. State College of Forestry, the writer has found it in great abundance in swampy regions in other parts of the Adirondacks.

Willow-ware is strongly recommended for use in tropical countries by *Indian Gardening* for the following reasons: It is not affected by the climate. Boards check and glue fail to hold. Considering the universal habit of the natives of carrying everything on their head a basket is lighter, easier, and handier than any other kind of package. Willow is superior to bamboo and rattan. Immense quantities of rods can be produced in the tropics in a year, and basket-weaving would prove a light, pleasant and remunerative employment for the natives.

In the May issue of the *National Geographic Magazine* in an article on the general geography of Alaska by Henry Gannett, Chief Geographer United States Geological Survey, there is the following statement:

"The interior of the territory is forested mainly with spruce, as far north as the valley of Koyukuk, and as far westward as the delta of the Yukon. In this enormous region there must be an almost fabulous amount of coniferous timber, sufficient to supply our country for half a century in case our other supplies become exhausted."

The use of the words "must be" spoils the significance of his observation. Such a statement must be misleading. It would not be wise for the people of this country to depend upon this supply even if it were at all available.

J. G.

RECENT PUBLICATIONS.

Instructions to Fire Wardens, State of New York. Forest, Fish and Game Commission. Pp. 23.

This little pamphlet opens with ten pages of instructions to fire wardens, by Col. William F. Fox, Superintendent of New York State Forests. Following this is given the text of the New York State laws relating to forest fires. There is also contained in the pamphlet a copy of the printed notice posted conspicuously throughout all the forest towns and a list of all the fire wardens.

Hearings Before the Committee on Public Lands of the House of Representatives, Relating to the Reclamation and Disposal of the Arid Public Lands of the West. Government Printing Office. Pp. 135. Plates XXXII.

This publication contains the statements made before the Committee on Public Lands of the House of Representatives at the last session of Congress. Four hearings were held by the committee during January and the statements made by the following gentlemen are recorded in full: Hon. F. G. Newlands, of Nevada; Charles D. Walcott, Director U. S. Geol. Survey; F. G. Newell, hydrographer U. S. Geol. Survey; Gifford Pinchot, forester, U. S. Dept. of Agriculture; a letter from Hon. E. A. Hitchcock, Secretary Dept. of the Interior; Hon. R. D. Sutherland, of Nebraska; N. H. Darton, geologist, U. S. Geol. Survey; George H. Maxwell, Chairman of Executive Committee of National Irrigation Association, editorial extracts on the national irrigation policy; Hon. Jno. C. Bell, of Colorado; Elwood Mead, irrigation expert of Dept. of Agriculture.

PUBLICATIONS RECEIVED.

Notes on a Collection of Cratægus Made in the Province of Quebec near Montreal. By C. S. SARGENT. Reprint from Rhodora, Vol. 3, no. 28.

New or Little Known North American Trees, III. By C. S. SARGENT. Reprint from the Botanical Gazette. Vol. XXXI., April, 1901.

Forestry for Kentucky. Reprint of an address by Dr. C. A. Schenck.

(*To be reviewed later.*)

Seventh Annual Report of the Commissioner of Public Roads of New Jersey for 1900. By HENRY I. BUDD. Pp. 191. 64 half-tone engravings.

This report shows that considerable progress during the past year has been made in New Jersey in the construction of good roads. Improvement of public highways, in many parts of the State, were carried on during the year of 1900. The report shows that since the passage of the State Aid Law, 532.11 miles of road have been constructed at a cost of $865,318.55. In 1900, 148.28 miles were constructed, and petitions for 491.73 additional miles have been filed, the cost of which is placed at $1,949,043.